

# Pre-Event Planning and Activities



## Principles of Smallpox Control

- Outbreak Detection.
- Diagnosis and Isolation of Cases.
- Search and Containment:
  - Active Case Search.
  - Contact Management.
- Vaccination.



The principles of smallpox control include

-detecting outbreaks

-diagnosing and isolating cases

-containing the outbreak through active searching for cases and through appropriate management of contacts

-and, vaccinating to prevent further outbreak

# Pre-Event Activities



## Pre-Event Training

Training for health care providers and public health staff:

- Clinical case definition.
- Differential diagnosis of febrile vesicular pustular rash illness.
- High level of alertness for cases of smallpox.
- Laboratory diagnostic issues (VZV, other).
- Notification procedures.
- Post-event surveillance methods (Case search and Contact Tracing).



The first step to establishing surveillance for smallpox is in training health care providers and public health staff on the disease itself, how to efficiently diagnose and differentiate the disease, and the laboratory testing used to confirm it.

## Epi/Surv/Summary

- Case interview.
- Contact identification.
- Contact households, other sites, travel modes.
- Contact risk category for prioritization.
- Assignment of contacts to tracing teams.
- Contact and contact household member interviews.
- Vaccination of contact and household members.
- Contact surveillance for fever/rash follow-up.
- Reporting of contacts with fever and rash for isolation.
- Vaccine take and severe adverse event surveillance.
- Reporting of severe adverse vaccination events.
- Maintaining forms and data files.
- Data reporting.



Public health authorities should have systems and protocols in place to interview the case and manage their contacts and the contacts of contacts through a series of interviews and follow-up activities.

## Pre-Event Smallpox Surveillance Clinical Case Definition\*

An illness with acute onset of fever  $\geq 101^{\circ}\text{F}$   
followed by a rash characterized by firm, deep-  
seated vesicles or pustules in the same stage of  
development without other apparent cause.



\* Note: definition modified from current draft smallpox response plan



This is the clinical case definition for smallpox during a pre-event period. This definition is slightly more broad than the standard case definition in the hopes that it will be more sensitive in catching a first case.

## Varicella Surveillance Clinical Case Definition

An illness with acute onset of diffuse (generalized) maculopapulovesicular rash without other apparent cause.



Since varicella is the illness most commonly confused with smallpox, it is important to learn this definition, as well. Remember that the smallpox rash will have a different appearance and feel than varicella.

## Epidemiology United States, 2001

Smallpox	Varicella
Spring seasonality (previously)	Spring seasonality
Age <ul style="list-style-type: none"> <li>• initial cases will depend on scenario for introduction</li> <li>• as outbreak progresses, cases in all ages groups</li> </ul>	Age <ul style="list-style-type: none"> <li>• Most cases in children</li> <li>• only 5-7% of cases occur among adults</li> </ul>
<ul style="list-style-type: none"> <li>• Entire population should be considered susceptible</li> <li>• no immunity among persons &lt; 30 years</li> <li>• may be partial immunity among some adults &gt; 30 years</li> </ul>	<ul style="list-style-type: none"> <li>• Susceptibility greatest in young children</li> <li>• 5% of adults 20-29 yrs and 1% of adults 30-39 yrs are susceptible</li> <li>• Adults born and raised in tropical countries more likely to be susceptible</li> </ul>



Since it's the disease most often confused for smallpox, it will be important to understand the epidemiology of varicella in order to determine the likelihood of a rash illness being smallpox. In the United States, the comparison was found to break down in interesting ways.

Both diseases (at least when smallpox was naturally occurring) are most commonly seen in the spring. While smallpox age ranges can be in any group, current varicella epidemiology finds them mostly in children, with only a small percentage of cases occurring in adults.

With smallpox, we consider the entire population to be susceptible. However, previous immunity might remain among adults who were previously vaccinated. Although rapidly changing after the introduction of varicella vaccine, the most cases still occur among young children, with very few adults susceptible, except for adults in tropical countries.



## Epidemiology United States, 2001

Smallpox	Varicella
Disease more severe at extremes of age and among immunocompromised	Disease more severe at extremes of age and among immunocompromised
Case fatality rate 20-30% variola major in unvaccinated	Case fatality rate 2-3/100,000 cases
Less infectious than varicella HH SAR ~ 50% (susceptibles)	Highly infectious from prior to rash onset. HH SAR 65-85%
No standard vaccination program	Now vaccine preventable



Both diseases are more severe at the extremes of age and among the immunocompromised, yet smallpox causes ten times more fatalities. For all those fatalities, however, varicella is much more infectious.

And as we know, smallpox vaccine is no longer routinely recommended, whereas a relatively new varicella vaccine is rapidly gaining acceptance and changing the epidemiology of the disease.

## Pre-Event Smallpox Surveillance

- Case definition specific – early cases will be missed.
- Minimize risk of false positive in conditions of zero cases with extremely low predictive value positive for smallpox test results.
- Varicella and disseminated herpes zoster – 2 million cases/year.
- Enteroviral infections – 10 million cases/year.



Because very few healthcare providers currently working have experience with smallpox and the early symptoms are indicative of so many other diseases, we know we will miss the first few cases. However, the pursuit of false positives can cost public health a lot in both personnel and funding when, at this time, we know that many of the rashes we'll see are more likely to be caused by varicella, disseminated herpes zoster or enteroviral infections.

## Suspected Smallpox Case

- Meets clinical case definition.
- Public health emergency.
- Arrange for laboratory testing.



If, after going through the rash illness algorithm, a case is considered to be suspect smallpox, it will mean a public health emergency. Laboratory testing should be obtained immediately so that the appropriate interventions can begin.

## Pre-event Preparation

Preparing for post-event surveillance and response:

- Identifying state/local lead for coordinating surveillance activities.
- Establish redundant mechanisms for reporting cases and communicating with reporting sources.
- Surveillance forms and reporting.



Public health authorities also need to prepare their surveillance systems by ensuring that there is someone dedicated to coordinating all surveillance activities and that there are several different mechanisms that are in place for reporting cases; such as standard physician reporting, as well as laboratory reporting. This may or may not be possible, but where it can be established, redundant mechanisms can help to capture suspicion as early as possible.

## Coordination

- Human resources (Local and National).
- Identify communication infrastructure.
- Stockpiles.
- Transport:
  - Supplies.
  - People.
  - Lab Specimens.



When planning for any public health emergency, public health planners need to consider several factors:

- What personnel and skills are available at the local and national level to assist in the outbreak?
- What kind of communications exist to work with these people?
- What kinds of medicines, vaccines, and supplies are available?
- And how will all these resources be transported?

Knowing these details will affect the strategy you plan for.

## Identify Staff

- Estimate number of teams/personnel needed – more is better!
- Case interviewers.
- Contact team supervisors.
- Support staff: secretaries, telephonists, data entry.
- Contact tracing teams: face-to-face vs. telephone.
- Vaccination status.



When identifying staff, the person designated to manage this activity should consider the population size and language(s) of their given area and estimate the number of teams that could respond to a case. They should also consider the number of supervisors and support staff they will need to support these teams. Estimates should take into account whether or not there will be enough contact tracing teams to conduct face-to-face interviews, which will take longer, or work via telephone.

## Train Staff

- Smallpox diagnosis and case definition.
- Risk categorization of contacts/contact sites.
- Case/contact interviewing methods and skills.
- Vaccination arrangements to be used; vaccine contraindications.
- Reporting of contact fever/rash, vaccination “take,” and severe adverse events.
- Record keeping: forms, databases, etc.



After the teams have been identified, they should be trained in smallpox diagnosis so that they can evaluate contacts for suspect cases of smallpox. They should also receive training in contact interviewing methods, skills, and how to evaluate those contacts for level of risk. They should also have a thorough understanding of the vaccination arrangements to be used, how to screen for contraindications to the vaccine, how to monitor for severe adverse events, and how to evaluate a patient for a vaccination “take.” And essential to good epidemiology, they should understand all forms and databases that will be used.

## Materials

- Forms:
  - Case forms, Contact forms, etc.
- Educational materials:
  - Smallpox recognition card.
  - Vaccination Status recognition card.
  - Vaccine contraindication sheet.
  - Vaccine Information Statement (VIS).
  - Vaccination “ticket.”



Public health authorities should also develop forms before an event occurs. Forms should be developed that will track case information and contact information. And to further assist the case managers, educational materials will need to be developed that help in the description of the disease, as well as various vaccination issues.



## Emergency Operations Center

National headquarters with specialists for supporting field teams:

- Operations coordinator and operations staff.
- Specialists in smallpox investigations, surveillance, lab, vaccine safety.
- Specialists in contact tracing, vaccine supply, policy and procedures.
- Communications, training, and hot line advisors.
- IT and computer support.



A central entity that can help to coordinate the response and review how things are going will be essential. Response teams in the field will need support to confer on issues of all aspects of the investigation, including surveillance, laboratory issues, and vaccine safety. A central location will also need to be identified to monitor the availability of resources and get them out to those in need. And other members will be necessary to provide basic support to those in the field.

## Creation Smallpox Response Teams

### Reasoning Behind:

- Smallpox attack will be reason for international concern and focus.
- National government will want people “on the scene” to coordinate response at national and local level.
- Local resources may become overwhelmed.



In order to quickly contain a smallpox outbreak, you will need teams that are already trained in smallpox disease and how to control it. A case of smallpox occurring will be a cause of quite a bit of alarm and pressure. Local resources could become quickly overwhelmed, not to mention concerned about the safety of their own families. With national-level response teams available, they could go in to assist when necessary.

## Human resources

- Identify state/local leader for coordinating contact tracing activities.
- Estimate number of teams needed - more is better.
- Identify and vaccinate state/local staff.
- Train state/local staff.
- Assure forms, informational pieces and other print materials are available.
- Contingency plan for additional staff.
- Protect the health and security of team members.



There are quite a few activities authorities will need to undertake in order to be prepared to deal with a case of smallpox. Fortunately, these activities also lend themselves to having a staff prepared for the management of many communicable disease outbreaks.

A central leader should be identified to coordinate contact tracing activities. This person will be key if the outbreak should get so large that contact tracing will need to be prioritized. This person should also be responsible for identifying the number of teams that would be needed to do appropriate contact tracing, given the geography and population of the area, as well as getting those teams prepared to respond.

Additional considerations will be what other staff can be quickly mobilized from other parts of public health or the medical community to help in outbreak control and how the health and safety of the team members will be assured.

## Well Functioning Teams

- Spirit of team work and sharing of information.
- “Get the job done” mentality.
- Recognize and utilize local experts.
- Share credit broadly, particularly with local counterparts. Make others look good.
- Use brief, succinct, and positive communications.
- Keep messages consistent among all team members.



The key to staffing response teams is to find members who can function well with other people and who are willing to do whatever tasks are given to them; even if it falls outside their particular area. Team members should also be willing to recognize the expertise and hard work of the local responders to avoid any hurt feelings that a national team is coming in. And the team members need to be able to communicate well. There will be long hours involved with any response, so those who can maintain a positive outlook and work out issues will make it easier.

## Sending in Response Teams Things to Remember

- Community physicians, hospitals, and Local Public Health Officials will be the real first responders.
- Most of the smallpox response work will be done by local public health officials.
- The local government knows their area. Don't see it as "taking over."
- Level of the national response will depend partly on:
  - Local Area Capacity.
  - Political Realities.



If you do set up response teams to assist a local area, it's important to remember that the local area health structure are the ones who should be responding to this. They'll be the first on the scene, they know their area and will have a strong sense of ownership of the investigation.

Any national response should depend on the local area's capacity to respond, although political realities may require national presence, even if a local area is capable of responding on their own.

## Sending in Response Teams Things to Remember

- Other national agencies may be involved under established emergency response plans.
- The national health agency will need to coordinate efforts with these other agencies.
- A criminal investigation will be taking place:
  - Criminal agency may have lead on response.
  - Public health may have to coordinate activities to improve response.



Another confounding factor will be the involvement of other national agencies that deal with emergency response and criminal investigation. Response teams from all coordinating agencies should be trained to understand their roles and responsibilities in an outbreak so as to avoid unnecessary confusion during response.

## Response Team Composition The US Response Team Structure

- Physician Team Leader
- Public Health Advisors
- Medical Epidemiologists
- Laboratory Scientist or Technician
- Information Technology Specialist  
Communications Specialists
- Community Liaison Specialists/Anthropologist
- Occupational Health Specialist



In the United States, national response teams are comprised of eight different members with various skills and abilities. Depending on the local area's capabilities, all or a combination of these positions will be deployed. Let's take a closer look at what skill sets and responsibilities each member has.

## Physician Team Leader

- Coordination and oversight of all team activities.
- Represents the national team in policy and political discussions with local HD.
- Delegates assignments to team members.
- Coordinates communication with national agency.



The Physician Team Leader will coordinate all team activities. This position will most likely spend the bulk of his time coordinating with local and state policy makers in order to coordinate decisions consistent with national policy. Based on the needs of the local area, this position will also designate tasks for the other team members.



## Senior Public Health Advisor

- Management skills with understanding of medical issues. Not necessarily nurse or physician.
- Serves as deputy to team leader for management and operations oversight.
- Represents team leader at operational meetings.
- Manages non-technical aspects of activities.
- Key problem solver and expediter.
- Frees up team leader to concentrate on medical issues.



The Senior Public Health Advisor is an employee with management skills. While they are not usually a nurse or physician, they are trained in public health and medical issues and understand what needs to happen during a response.

The Senior Public Health Advisor helps to manage personnel issues, coordinate team member activities, assist team members in their own needs, and maintain reports for the national agency. Because of their management background, Senior Public Health Advisors are able to take care of the day-to-day problems that arise and can assist the team in getting their more mundane activities accomplished. Bringing along this position also frees up the Physician Team Leader for more of the policy and medical decisions.

## Public Health Advisors

- Managerial positions with training in epidemiology skills.
- Assist Local HDs to establish policy and manage:
  - Contact tracing.
  - Vaccinations.
  - Training.
- Other duties as assigned.
- Frees up medical team members to work on medical planning and evaluation.



The general Public Health Advisors are also management positions. However, their training in epidemiology consists of contact tracing and researching skills. They also have experience in doing trainings for other medical personnel, as well as translating scientific theories into lay language for the public. These positions can also be trained to administer vaccinations, if necessary. The number of Public Health Advisors sent out with a team will depend on the needs of the local area.

By doing all the footwork in the investigation, the public health advisors free up the medical staff to work on medical issues and evaluation of the outbreak.

## Medical Epidemiologists

Serve as technical consultants for:

- outbreak investigation.
- surveillance.
- data collection.
- isolation.
- hospital infection control.
- communication of technical info to local HD.



The Medical Epidemiologists are either physicians, nurses, or PhD epidemiologists who serve as technical consultants in the response. They have a strong understanding of epidemiology and can assist the local area in investigation procedures, conducting surveillance and analyzing that surveillance. They can also help the local area understand technical information in order to make good decisions about how to manage the outbreak.

## Medical Epidemiologist – Vaccine Safety

Coordinates activities for:

- diagnosing and monitoring adverse events.
- medical care for serious adverse events.
- reporting.
- analysis.
- coordinating safety and risk messages with communications specialists.



The Medical Epidemiologist coordinating vaccine safety issues assists with establishing surveillance for vaccine adverse events. They are trained to diagnose those events and advise on medical support for those cases. They also analyze all incoming data in order to monitor for any unexpected adverse events and to create safety and risk messages with the communication specialists.

## Laboratory Scientist or Technician

- Advise medical care providers and laboratories on all aspects of:
  - specimen collection.
  - handling.
  - processing.
  - safety.
- Serve as liaison with national laboratory on shipping, specimen quality, and results.



The CDC also maintains a group of laboratory scientists and technicians who can deploy to help train medical providers and laboratories on all aspects of laboratory diagnosis, from specimen collection and handling to the processing of tests. They also help to coordinate the referral of specimens to the national laboratory.

## Communications Specialists

- Serve as liaison between team and communications specialists for:
  - health agencies.
  - emergency and police agencies.
  - political offices.
- Advise and assist with drafting press materials, handling press inquiries, dealing with public, and coordinating with national agency.



The Communications Specialists help to coordinate all messages between the various health agencies, emergency response agencies, criminal agencies, and political offices. During a smallpox outbreak, rumor control and consistent messages will be key to keeping the public calm. These specialists can also help the local area with dealing with the press.

## Community Liaison Specialists/ Anthropologist

- Serve as contact to local hospitals, infectious disease specialists, health department officials, and other key community responders to:
  - identify and brief key community partners.
  - assist in management of community outreach staff.
  - help prepare for and hold partner briefings.
  - assist in communication and educational activities for quarantined persons and families, contacts, etc.
  - report outreach progress and requirements to team leader and CDC.
- Facilitates flow of information to places where community goes for information and answers, e.g., hotlines, etc.



During the rush of an outbreak response, community partners sometimes get left out of the loop, despite the fact that they'll be helping implement recommendations and dealing directly with the public. The Community Liaison Specialists can maintain contact with key partners and hold briefings for those partners to keep them up-to-date on the most current recommendations. This position can also assist those who are quarantined.

## Information Technology Specialists

- Assists and coordinates data management for:
  - surveillance.
  - lab specimens and results.
  - contact tracing.
  - vaccinations.
  - adverse events.
- Problem solver for software and connectivity issues with team and local counterparts.



The Information Technology Specialists are key to assisting with technology issues. These positions should be familiar with database construction and have a broad understanding of various software and hardware in order to facilitate the exchange of data between various levels of government. They should be able to create and implement databases onsite, as needed.



## Occupational Health Specialist

- Provide guidance on personal protective equipment for exposed workers and team.
- Ensure adequacy of engineering (e.g., ventilation--negative pressure rooms) and administrative controls.
- Provide guidance on site safety and health plan  
Coordinate with agencies (at all levels) responsible for occupational issues.
- Facilitate worker notification regarding exposure and risk of disease.
- Facilitate employee and labor representation in meetings.
- Technical assistance on occupational illness and exposure surveillance.



The Occupational Health Specialist is key to ensuring that the controls are in place to protect all personnel, from the national response team to the local level healthcare providers. Some of their tasks should include training the teams and exposed workers on personal protect equipment, ensuring that negative pressure rooms are working correctly, and providing and developing guidance on occupational health issues.

# Isolation

- Establish what laws exist.
- Enforcement.
- What facilities exist:
  - Negative air pressure rooms.
  - Facilities that can be converted into smallpox facilities.
- Training response team:
  - Case management.
  - Infection control.



Part of what the response teams will need to understand is what exists in terms of isolation in the area. They should understand the laws and regulations pertaining to isolation both at the national and local level, who is responsible for enforcement, what facilities exist, and how to protect themselves during the response.

## Vaccination Strategies

- Identify providers of the vaccine.
- Sources for bifurcated needles.
- Sources for VIG/Cidofovir.
- Vaccine Storage and mobilization.
- Distribution mechanisms.
- Planning vaccine administration.
- Monitoring for Adverse Events (forms, data collection).
- Vaccinate frontline respondents.



Authorities will also need to identify the vaccination resources available in order to understand how they will be able to respond. The availability of vaccine, bifurcated needles, and VIG will determine the type of vaccination strategy to be used, as well as the ability to get the vaccine out to the local area. They will also need to have a mechanism established for monitoring for adverse events.

## Criteria for Implementation of Smallpox Response Plan

- Confirmation of smallpox virus, antigen or nucleic acid in a clinical specimen.
- Large outbreak of clinically compatible illness pending etiologic confirmation.
- Confirmation of smallpox virus in environmental sample, package or device associated with potential human exposure.
- Reports of suspected or probable cases once an outbreak has been previously identified.



Authorities will also need to understand what will trigger the implementation of their smallpox response plan. In the United States, it has been determined that triggering of the response plan will occur if there is confirmation of the virus in a specimen, a large outbreak of a clinically compatible illness, or the confirmation of smallpox virus in an environmental sample or distribution device.